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UAS Advances Idaho Power's Habitat Monitoring Efforts

Introduction & Background

Idaho Power is a regulated electric utility in Idaho that serves customers in southern Idaho and eastern Oregon. With 17 hydroelectric plants, mostly along the Snake River, Idaho Power is committed to being a good steward of the land. Each year, fish biologists and researchers from Idaho Power count fall Chinook salmon spawning beds, called redds, along the river, flying in helicopters to do a manual count. Idaho Power collaborates with many groups to conduct the surveys, including the U.S. Fish and Wildlife Service, Idaho Fish & Game, and the Nez Perce Tribe.

The Snake River fall Chinook salmon are a protected species under the Endangered Species Act. Prior to depositing her eggs, each female salmon constructs a nest, or "redd", by digging away and cleaning river gravels with her tail and body. Redds can be as large as three meters wide and five meters long, and are easily identified from the air, due to their light-colored gravel contrast to the dark gravel riverbed. The spawning season of these fish runs from late October through early December, approximately 7 – 8 weeks total.

The narrow character of the Hells Canyon Reach of the Snake River, along with the unpredictable weather that can occur along the river corridor during the fall months, creates a hazardous environment for flying in helicopters. After having several dangerous experiences while conducting the helicopter surveys, fish biologists Phil Groves and Brad Alcorn saw an opportunity to reduce risk and improve safety by using a small unmanned air system (sUAS) to fly the survey routes. The sUAS surveys are a safe and effective alternative that achieves the same results with less danger to human life.

Approach

Idaho Power conducted their first sUAS survey missions in 2011. They used a hexacopter, a sUAS with six rotors. After achieving extraordinary results with sUAS, the FAA informed them that new regulations were being proposed, and they were asked to discontinue the survey missions.

Groves and Alcorn reached out to researchers at University of Alaska-Fairbanks due to their ongoing research and success in land mapping and other UAS applications. University researchers were able to secure permission from the FAA to fly the same routes, so a partnership was formed. Each October, University of Alaska-Fairbanks researchers travel to Idaho to fly the survey routes with an Aeryon Scout, a Canadian-manufactured sUAS with four rotors and an attached camera.

When manned helicopter survey flights take place, the helicopter flies the entire length of the river, counting every redd along the way. During the sUAS surveys, the researchers fly a select number of "index sites" that biologists have identified, and collect either high definition video or photographs of the river bottom. Based on the counts at the index sites, an estimated total number for the entire river is then computed. Presently,

biologists and researchers are comparing how the sUAS data compares with the traditional helicopter surveys. It is hoped that in the future the sUAS flights will replace all but one of the helicopter surveys.

Results

The data provided from the sUAS index flights has been a clear success to date. The resultant estimates of total river spawning, developed from the sUAS data, has been comparable to the total census collected during manned helicopter surveys.

In 2011:

Census surveys from manned helicopter flights reported 1,949 redds
sUAS estimate, based on flying 17 index sites, totaled 1,922 redds

In 2012 (after developing a more statistically sound estimation technique for the sUAS data):

Census surveys from manned helicopter flights reported 1,375 redds
sUAS estimate, based on flying 27 index sites, totaled 1,581 redds (+/- 674)

Idaho Power currently flies four manned helicopter surveys each spawning season, while using sUAS flights on the index sites throughout the entire spawning season. Provided that the FAA can develop a reasonable regulatory framework that allows commercial entities to take advantage of sUAS technology, Idaho Power will be able to eliminate all but one of the manned helicopter flights associated with the fall Chinook monitoring program.

Due to the positive results of the salmon surveys, Idaho Power is hopeful that sUAS technology can be incorporated into other environmental applications and programs, including vegetation and stream bank monitoring, as well as recreational and archaeological site monitoring. There is also the possibility that, as the technology becomes more sophisticated and cost effective, sUAS could be used to conduct power line and facility surveys. This type of use is already being tested by electric utilities in New Zealand and parts of Europe.

The ultimate goal of Idaho Power's sUAS efforts is to reduce or eliminate the potential for human risk, while increasing safety and still being able to collect high quality data.

More Information

For more information on Idaho Power and their UAS programs, please visit:

- [YouTube video](#)